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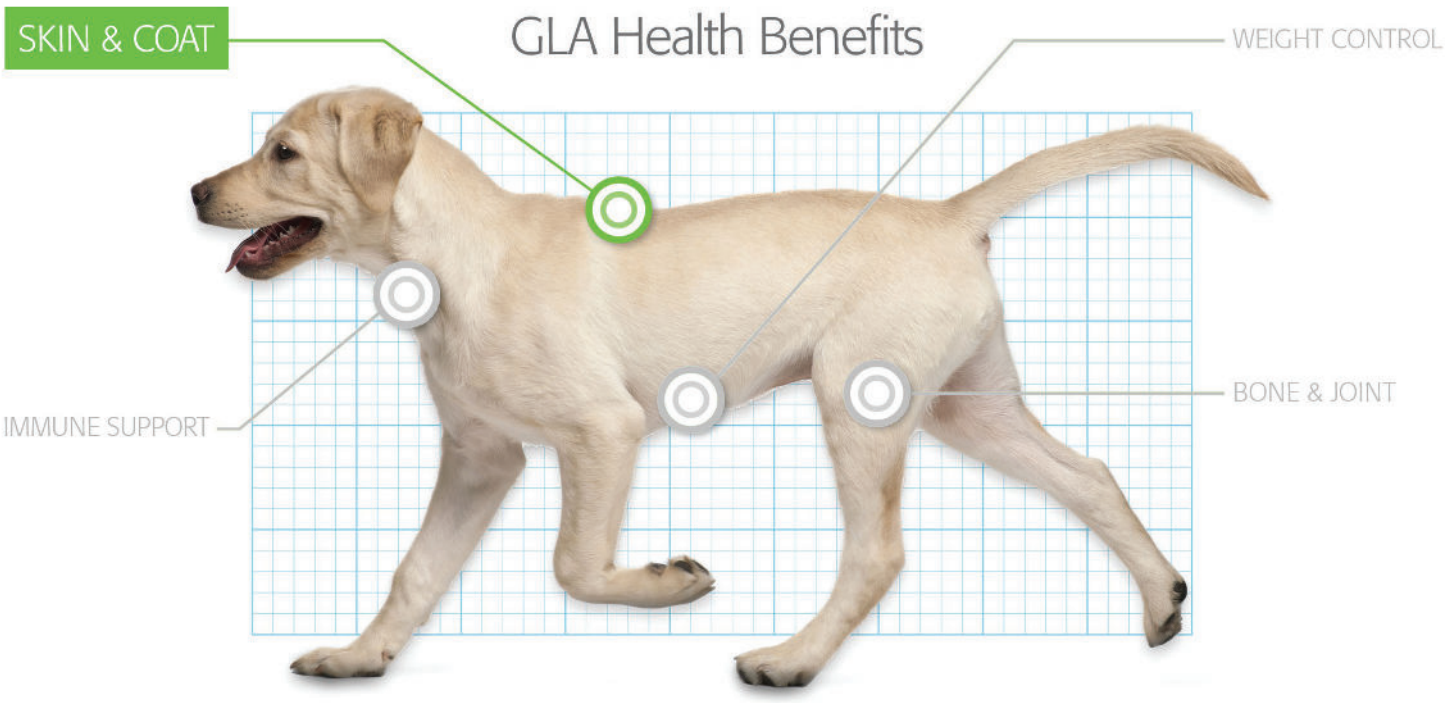

GLA in pet food diet improves skin and coat health and reduces dependency on steroids to control atopic dermatitis.

By: Gia Fazio, Ph.D.

Abstract

Atopic dermatitis manifests in dogs and cats causing dry, irritated, itchy skin and can lead to lesions that cause discomfort and require treatment with glucocorticoids and/or antihistamines. Aside from unwanted side effects, these medications do not prevent the issue from reoccurring. Multiple studies have shown that poly-unsaturated fatty acids (PUFAs), including gamma-linolenic acid (GLA), added to a pet's diet mitigates atopic dermatitis and supplants the use of medication. The addition of PUFAs restores healthy lipid composition and supports the skin's natural impermeability to irritants or genetic factors that trigger atopic dermatitis. GLA, when consumed with other PUFAs, improves skin health, corrects atopic dermatitis and can prevent discomfort in pets.

Introduction

Atopic dermatitis (AD) is a common issue observed in dogs and cats. It is an inflammatory, chronic skin disease often caused by allergies or a genetic predisposition. The disease can cause multiple issues, including pruritus, anywhere on the skin but often on the ears, legs, muzzle, underarms and paws. Lesions can also develop as a primary response caused by the immune system or as a secondary response from self-grooming, leading to bacterial and fungal infections (Moriello 2016). Research has shown that there can be a genetic component that predisposes the pet to the inflammatory response which causes all of the uncomfortable symptoms. However, the disease can also be brought on by environmental factors such as grass, mold, dust or cleaning products (PetMD n.d.).

The disease is perpetuated due to over-reaction by the immune system to the irritants. Therefore, traditional treatments address blocking the immune response. Treatment is quite involved and can include topical or oral glucocorticoids, anti-histamines and/or environmental adjustments. While effective, the treatments must be prolonged (6-12 months) before improvement is observed (Moriello 2016). Additionally, because the illness is likely to reoccur, repeated use of glucocorticoids can lead to undesirable side effects including increased hunger and thirst, increased urination, lethargy, restlessness, secondary infections, mange, Cushing's Disease and multiple organ dysfunction (Ward 2008).

GLA offers a healthy solution

Researchers have investigated potential alternatives addressing the animal's diet. Multiple studies have revealed consistent success through implementation of additional fatty acids to the pet's diet. However, the composition of that diet is specific to omega-3 and omega-6 fatty acids; specifically, the omega-6 fatty acid gamma linolenic acid (GLA). GLA is an omega-6 fatty acid that can be consumed through natural sources including evening primrose oil, black currant oil, borage oil and GLA safflower, although only GLA safflower oil has been approved by FDA for use in dog food. Other plant sources of GLA are oats, barley and spirulina. Additionally, trace amounts can be found in animal protein; however, the values are very low and inconsistent. Once consumed, GLA is modified to dihomo-gamma-linolenic acid (DGLA) which leads to the formation of prostaglandin E1 (PGE1). PGE1 moderates the inflammatory response and can suppress the negative immune response perpetuated by atopic dermatitis (AD). This pathway is outlined in Figure 1.

Integration of GLA into the pet's diet reduced the symptoms of pruritus (Saevik, et al. 2004), the histamine response (Gueck, et al. 2004) and actually decreased the total number of peripheral blood mononuclear cells (PBMCs), which are the lymphocytes produced by the immune system (Stehle, et al. 2010). Improvement in the pet's health was observed within 3 months of dietary integration (Saevik, et al. 2004) and may actually prevent AD from reoccurring (Gueck, et al. 2004). In fact, in a blind study, dogs given GLA were able to reduce the total dose of glucocorticoids administered and increase the total amount of GLA over dogs being given a placebo (Saevik, et al. 2004). In a separate study, dogs given GLA saw a significant reduction in symptoms of AD including pruritus, edema, skin irritation and self-grooming/trauma within 8 weeks (Harvey 1999).

Due to the positive research results, veterinarians and multiple pet health websites support the addition of GLA to the pet's diet to improve their coat and treat atopic dermatitis (Smith 2017; Kidd 2017; Hilton 2011; Silver 2017).

How it works

The biochemical mechanism for AD is not completely understood, but some biological similarities among patients have been observed. Researchers measured the lipid content in the skin of affected animals (Popa, et al. 2011). It was found that increased amounts of linoleic acid (LA) accumulate in animals with AD. This is likely attributable to reduced activity of the delta-6 desaturase enzyme which converts LA to GLA (Popa, et al. 2011; Horrobin 2000). Additionally, cats cannot synthesize linoleic acid and arachidonic acid, nor alpha linolenic acid; dogs similarly cannot synthesize linoleic nor alpha-linolenic acids. Therefore, it is essential that these fatty acids are made available in the diet of cats and dogs in sufficient levels (Smith 2017). Otherwise, if there are competing pathways which require these fatty acids, it could negatively impact general health and exacerbate conditions such as AD.

It is the activity of downstream enzymes that modify GLA to DGLA to generate PGE1 which mediates the inflammatory response (Popa, et al. 2011; Horrobin 2000). As shown in Figure 2, the delta-5 desaturase modifies DGLA to other eicosanoids such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) and the enzyme has been shown to have decreased activity in pets with AD and research suggests that DHA might also mitigate AD (Seidel, Gueck and Fuhrmann 2005). It is theorized that due to genetic reasons or age, reduced activity of delta-6 desaturase occurs in animals affected by AD, causing LA to accumulate, while reducing the downstream metabolites and limiting the body's natural ability to mediate the inflammatory response (Horrobin

Figure 1.

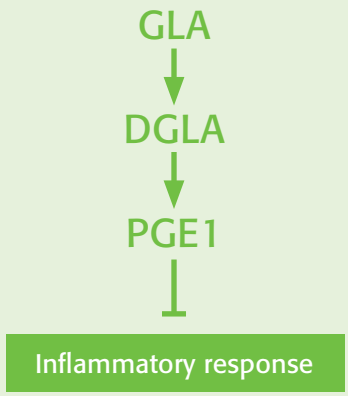

Figure 1. The influence of GLA and its metabolites on moderating the inflammatory response.

Figure 2.

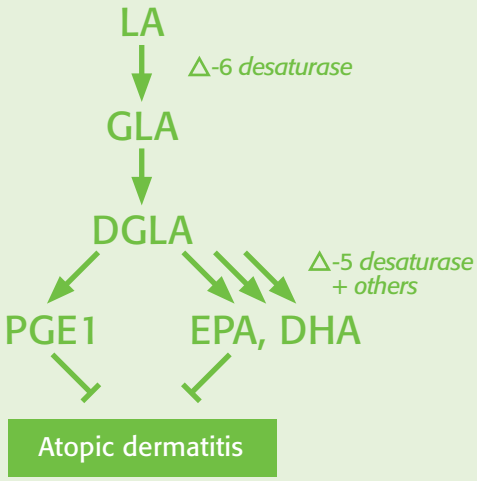

Figure 2. Linoleic acid (LA) is modified by delta-6 desaturase (Δ-6 *desaturase*) to form GLA, then DGLA. It is the activity of DGLA that spurns PGE1 to decrease the inflammatory response, as well as the activity of enzymes such as delta-5 desaturase (Δ-5 *desaturase*) to generate production of the eicosanoid DHA to decrease the symptoms of atopic dermatitis in dogs and cats. Both enzymes (Δ-6 *desaturase* and Δ-5 *desaturase*) have been shown to have decreased activity in animals with AD. By increasing GLA in the pet's diet, it supports the production of natural products to combat AD.

2000). In addition to the reduction of specific metabolites, the overall lipid composition of the skin has been degraded which increases skin permeability, making it more susceptible to irritation and infection (Popa, et al. 2011).

However, studies have shown healthy skin function and composition can be restored. The research demonstrates supplementation of a pet's diet with PUFAs including GLA eliminates the symptoms of AD, restores healthy lipid function and composition in the skin, and can reduce the dependence on glucocorticoid medication for long-term pet health. GLA is a naturally occurring metabolite that supports the pet's inherent immune system and, through continued use, minimizes the incidence of AD in dogs and cats.

Ensuring regular consumption at sufficient levels is key

The studies that were performed introduced GLA as part of the animal's daily diet at steady levels. While beneficial results were observed including improved dermal health (Popa, et al. 2011), reduction in atopic dermatitis symptoms and reduction of glucocorticoid medication (Saevik, et al. 2004), the results were not observed until minimally 80 days after initiation of treatment. Therefore, it is key to ensure the animal is receiving supportive amounts of GLA and other PUFAs regularly. In the case of these studies and often in practice, this can be achieved through direct addition of supplements to the pet's food or feeding a pet food with a guaranteed amount of GLA contained in the food.

In addition to ensuring sufficient levels are present in the diet, the ratio of omega-6 to omega-3 fatty acids is also important. Generally, the studies offered a range of 5:1 to 20:1 of omega-6 to omega-3 fatty acids and the successful results observed in reduction of AD maintains a higher concentration of omega-6 fatty acids compared to omega-3. Further, it is the presence of the omega-6 fatty acid GLA which has a significant impact (Gueck, et al. 2004; Harvey 1999; Saevik, et al. 2004).

There are multiple sources of GLA including borage oil, evening primrose oil and black currant oil; however these oils have not been approved by FDA for use in pet diets. Recently, FDA has approved the use of a safflower variety which produces high amounts of GLA oil (minimum 40% of the total fatty acids). It is marketed under the name SONOVA® and is the only FDA-approved source of GLA for use in dog food (Food and Drug Administration Federal Register 2017).

Summary

Supplementation of a pet's diet with gamma linolenic acid (GLA) will improve skin and coat health and compensate for underlying environmental or genetic conditions that degrade the pet's well-being. Multiple studies extending nearly 100 years have demonstrated GLA can improve the skin's natural ability to resist irritation, pruritus, and permeability to fungal and bacterial infections, which are all manifestations of atopic dermatitis (AD). Supplementation of the pet's diet with GLA can reduce the symptoms of AD, decrease dependency on glucocorticoid medications, and prevent AD from reoccurring. GLA in a pet's diet improves the quality of life for both the animal and their caretaker.

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